



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST-NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/728,244	12/01/2000	Thomas J. Bucholz	DE3-0081	2505

7590 06/20/2003

EDMUND P. ANDERSON
DELPHI TECHNOLOGIES, INC.
Mail Code: 480-414-420
P.O. Box 5052
Troy, MI 48007-5052

EXAMINER

JOYCE, WILLIAM C

ART UNIT

PAPER NUMBER

3682

DATE MAILED: 06/20/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/728,244

Applicant(s)

BUCHOLZ ET AL.

Examiner

William C. Joyce

Art Unit

3682

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 March 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-25, 27-41 and 43-46 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 27-31, 45 and 46 is/are allowed.
- 6) ☒ Claim(s) 1-3, 6-12, 15-25, 32, 33, 38-41, 43 and 44 is/are rejected.
- 7) ☒ Claim(s) 4, 5, 13, 14 and 34-37 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

This Office Action is in response to the amendment filed March 27, 2003 for the above identified patent application.

1. The indicated allowability of claims 1-25, 27-37, 39-41, and 43-46 is withdrawn in view of the newly discovered reference(s) to Hotline (US Patent 2,764,034) and Doolittle et al. (US Patent 3,472,092). Rejections based on the newly cited reference(s) follow.

Claim Rejections - 35 USC § 102

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. Claims 1, 2, 8, 11, 22, 24, 25, 32, and 33 are rejected under 35 U.S.C. 102(b) as being anticipated by Doolittle et al. (US Patent 3,472,092).

Doolittle et al. discloses a means for eliminating backlash between meshing gears, wherein one of the gears is formed with flexible teeth and engages corresponding teeth of a second gear with double flank contact. Specifically, the flexible teeth are slightly skewed due to a gear shaping operation such that the teeth engage the meshing gear in double flank contact in order to eliminate backlash in the gear device. Doolittle et al. describes the meshing teeth as an "interfering mesh" (column 3, line 70) and that "flexing of the rim and the web at the meshing areas introduces loading which urges the gear teeth 18 of gear 10 into tighter meshing engagement with the teeth of the other gears, thereby taking up an lost motion and eliminating backlash"

(column 4, lines 4-9). Accordingly, in order to eliminate backlash, it is understood that the teeth must be in double flank contact.

With respect to the limitations defining the gearing as a worm arrangement, Doolittle et al. describes the backlash reducing drive can be used in combination with worm gears (see Column 3, lines 54-58).

With respect to claims 22 and 24, it is understood that the gear arrangement to Doolittle et al. inherently meets the claim limitations. Specifically, the flexible material used in forming the flexible teeth inherently has a spring rate which increases as the load applied to the teeth increases.

Claim Rejections - 35 USC § 103

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
5. Claims 1-3, 6-12, 15, 16-25, 32, 33, 38-41, 43, and 44 rejected under 35 U.S.C. 103(a) as being unpatentable over Hotine (US Patent 2,764,034) in view of Doolittle et al. (US Patent 3,472,092).

Hotine discloses a means for eliminating backlash between meshing gears, wherein one of the gears is formed with flexible teeth and engages corresponding teeth of a second gear with double flank contact. Specifically, the flexible teeth are slightly skewed relative to the gear axis such that the teeth engage the meshing gear in double flank contact in order to eliminate backlash in the gear device. Hotine does not disclose the gears as a worm gear arrangement, however it was known to use backlash reducing

gear means for reducing backlash of a worm drive. For example, the prior art to Doolittle et al. teaches a backlash reducing drive used in combination with worm gears (see Column 3, lines 54-58). It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the gear having flexible teeth of Hotine so as to be used in combination with a worm, as taught by Doolittle et al., motivation being to provide an increased gear reduction between the mating gears.

With respect to the limitations defining the meshing gears having helical teeth, Hotine discloses "gears with spiral or helical teeth may be used" (column 3, lines 39-41).

With respect to the limitations defining the spring rate of the deformable teeth being based on the load being transmitted by the meshing gears, it is understood that the gear arrangement to Hotine inherently meets the claim limitations. Specifically, the flexible material used in forming the flexible teeth inherently has a spring rate which increases as the load applied to the teeth increases.

With respect to the location of the claimed load contact area of the meshing gears, it is understood that the gear arrangement to Hotine inherently meets the claim limitations. Specifically, the flexible material used in forming the flexible teeth inherently has a contact area which varies based on the load applied to the gear arrangement.

With respect to claims 7 and 16, Hotine does not disclose the helical angle of the gears. It would have been obvious to one of ordinary skill in the art at the time the invention was made to set the helical angles as claimed, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Einstein, 89 USPQ 167.

Allowable Subject Matter


6. Claims 4, 5, 13, 14, and 34-37 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

7. Claims 27-31, 45, and 46 are allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to William C. Joyce whose telephone number is (703) 305-5114. The examiner can normally be reached on Monday - Thursday 7:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Bucci can be reached on (703) 308-3668. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 305-7687 for regular communications and (703) 305-7687 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1113.


William C. Joyce
June 13, 2003